ORIGINAL COURSE IMPLEMENTATION DATE: May 1977
REVISED COURSE IMPLEMENTATION DATE: September 2027
COURSE TO BE REVIEWED (six years after UEC approval)**:** December 2031
Course outline form version: 26/01/2024

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: MATH 111	**Number of Credits:** 4 Course credit policy (105)
Course Full Title: Calculus I **Course Short Title:** Calculus I	
Faculty: Faculty of Science	**Department (or program if no department):** Mathematics & Statistics

Calendar Description:

Differential calculus of a function of one variable, in the context of elementary functions (algebraic, trigonometric, inverse trigonometric, exponential, and logarithmic). Calculation and interpretation of limits and derivatives, applications including curve sketching, optimization, exponential growth, and related rates, and an introduction to antidifferentiation.

Note: Students are strongly recommended to take the UFV Calculus Readiness Test prior to registration to assess their readiness for the course. Students should consult Advising to discuss options such as MATH 110 to improve readiness.

Prerequisites (or NONE):	One of the following: (A or better in one of Calculus 12 or Pre-calculus 12) or (B or better in both Pre-calculus 12 and Calculus 12) or (B or better in one of Principles of Mathematics 12, MATH 095, or MATH 096) or (B or better in both MATH 092 and MATH 093) or (C+ or better in MATH 110) or (at least 70% on the MDPT).
Corequisites (if applicable):	None.
Pre/corequisites (if applicable):	None.

Antirequisite Courses *(Cannot be taken for additional credit.)*

Former course code/number:

Cross-listed with:

Equivalent course(s):

(If offered in the previous five years, antirequisite course(s) will be included in the calendar description as a note that students with credit for the antirequisite course(s) cannot take this course for further credit.)

Typical Structure of Instructional Hours

Lecture/seminar	60
Total hours	**60**

Scheduled Laboratory Hours

Labs to be scheduled independent of lecture hours: ☒ No ☐ Yes

Course Details

Special Topics course: **No**

(If yes, the course will be offered under different letter designations representing different topics.)

Directed Study course: **No**

(See policy 207 for more information.)

Grading System: **Letter grades**

Delivery Mode: **May be offered in multiple delivery modes**

Expected frequency: **Every semester**

Maximum enrolment (for information only)**: 36**

Prior Learning Assessment and Recognition (PLAR)

PLAR is available for this course.

Transfer Credit *(See bctransferguide.ca.)*

Transfer credit already exists: **Yes**

Submit outline for (re)articulation: **No**

Department approval	**Date of meeting:**	February 12, 2025
Faculty Council approval	**Date of meeting:**	September 5, 2025
Undergraduate Education Committee (UEC) approval	**Date of meeting:**	December 19, 2025

Learning Outcomes *(These should contribute to students' ability to meet program outcomes and thus Institutional Learning Outcomes.)*

Upon successful completion of this course, students will be able to:

1. Communicate mathematical results and computations using rigorous notation and terminology.
2. Apply theorems and perform associated calculations to evaluate limits, including one-sided limits, limits involving infinity, and indeterminate forms.
3. Determine if a function is continuous at a point by applying the definition of continuity.
4. Calculate derivatives of basic algebraic functions using the limit definition.
5. Interpret derivatives as instantaneous rates of change, in numerical, graphical, and functional contexts.
6. Calculate derivatives of algebraic combinations and compositions of elementary functions (algebraic, trigonometric, inverse trigonometric, exponential, logarithmic).
7. Apply the methods of calculus to determine key features of graphs, such as asymptotes, relative extrema, and points of inflection.
8. Apply the methods of calculus to solve applied problems involving related rates of change, optimization, exponential growth, and linear approximations.
9. Draw conclusions about functions based on major calculus theorems such as the mean value theorem, the intermediate value theorem, and Fermat's theorem.
10. Demonstrate proficiency with the use of graphing technology to explore mathematical concepts.

Recommended Evaluation Methods and Weighting *(Evaluation should align to learning outcomes.)*

Final exam:	40%	Assignments:	10%		%
Quizzes/tests:	50%		%		%

Details:

To pass the course, students must achieve at least 40% on the comprehensive final exam.

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Instructional Methods *(Guest lecturers, presentations, online instruction, field trips, etc.)*

Lectures are interspersed with problem sessions; Mathematical software will be incorporated by various means.

Texts and Resource Materials *(Include online resources and Indigenous knowledge sources. Open Educational Resources (OER) should be included whenever possible. If more space is required, use the Supplemental Texts and Resource Materials form.)*

	Type	Author or description	Title and publication/access details	Year
1.	OER book	Feldman, Rechnitzer, & Yeager	CLP-1 Differential Calculus	2016
2.	Textbook	Stewart, Clegg, & Watson	Single Variable Calculus, Early Transcendentals, 9th ed. Cengage	2021
3.				
4.				
5.				

Required Additional Supplies and Materials *(Software, hardware, tools, specialized clothing, etc.)*

Course Content and Topics

Exact course content and ordering may vary slightly from year to year but will encompass the following:

1. Preliminaries:
   a. Brief review of functions, functional notations, and graphs
   b. Review of special functions and their graphs: power, polynomial, rational, exponential, inverse, logarithmic, trigonometric
2. Limits:
   a. Methods and theorems for evaluation
   b. One-sided limits
   c. Limits involving infinity
   d. Continuity; Intermediate Value Theorem
3. The derivative:
   a. Interpretation of the derivative as a rate of change
   b. Geometric interpretation of first and second derivatives
   c. Definition of derivatives using numerical methods
   d. Formal definition of the derivative
4. Differentiation of special functions:
   a. Power functions
   b. Exponential functions

c. Product, quotient, chain rules
d. Trigonometric functions, inverse trigonometric functions
e. Implicitly-defined functions
f. Logarithmic differentiation

5. Applications of the derivative:
   a. Linearization and differentials
   b. Curve sketching and analysis of function behaviour; Mean Value Theorem
   c. Analysis of families of curves
   d. Optimization problems from various disciplines, which may include physics, chemistry, biology, population studies, economics
   e. Related rates problems from various disciplines
   f. Newton's method
   g. L'Hôpital's rule
6. Antiderivatives
7. Polar curves and parametric functions:*
   a. Polar coordinates and curves, with applications
   b. Differentiation of polar curves
   c. Parametric functions and applications
   d. Differentiation of parametric functions

*This content will be covered as time permits. Graphing software is particularly useful in exploring these concepts.